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Cervical Cancer Screening Among Young Adult Women in the United States

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Abstract

Background—Cervical cancer screening guidelines have evolved significantly in the last decade for young adult women, with current recommendations promoting later initiation and longer intervals.

Methods—Using self-reported cross-sectional National Health Interview Survey (NHIS) 2000–2010 data, trends in Papanicolaou (Pap) testing among women ages 18–29 years were examined. NHIS 2010 data were used to investigate age at first Pap test (*N* =2,198), time since most recent Pap test (*n* =1,622), and predictors of Pap testing within the last 12 months (*n* = 1,622).

Results—The percentage of 18-year-olds who reported ever having a Pap test significantly decreased from 49.9% in 2000 to 37.9% in 2010. Mean age at first Pap test in 2010 was significantly younger for non-Hispanic black women (16.9 years), women < high school education (16.9 years), women who received the HPV vaccine (17.1 years), and women who have ever given birth (17.3 years). The majority reported their last Pap test within the previous 12 months (73.1%).

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No potential conflicts of interest were disclosed.

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Usual source of healthcare (OR, 2.31) and current birth control use (OR, 1.64) significantly increased chances of having a Pap test within the previous 12 months.

Conclusions—From 2000 to 2010, there was a gradual decline in Pap test initiation among 18-year-olds; however, in 2010, many women reported ≤12 months since last screening. Evidence-based guidelines should be promoted, as screening young adult women for cervical cancer more frequently than recommended can cause considerable harms.

Impact—A baseline of cervical cancer screening among young adult women in the United States to assess adherence to evidence-based screening guidelines.

Introduction

During the last 6 decades, reductions in cervical cancer incidence and mortality have been achieved, due to integration of cytology into women's preventive healthcare (1, 2), and increased understanding that cervical cancer is caused by persistent infection with human papillomavirus (HPV; refs. 3–6). HPV is the most common sexually transmitted infection, with peak prevalence among females ages 14–24 years (7). Persistent HPV infections occur within a few years of first sexual intercourse (8) but can take years to develop into invasive cervical cancer (9–11). Although the prevalence of HPV is greater among younger women than among women of older ages (7), cervical cancer incidence is very rare in women younger than 29 years of age (4, 12) because the majority of HPV infections are transitory and usually regress spontaneously within 2 years (9).

Cervical cancer screening guidelines for average-risk women have evolved significantly over the last decade promoting later initiation and longer intervals. In 2000, guidelines recommended to begin screening at 18 years of age or at initiation of sexual activity (13–15), with annual (14, 15) to triennial (13) intervals. By 2003, the U.S. Preventive Services Task Force issued recommendations and rationale for later starting age and triennial screening intervals (16). In November 2012, concurrence across organizations was achieved; average-risk women should avoid screening before 21 years of age, with triennial screening intervals until 65 years of age (17–19).

Guidelines that promote recommendations for *less* intervention can be difficult for physicians and the public to understand and support (20). However, as screening increases, so do false-positive test results and colposcopies, with more false-positive test results occurring in women aged younger than 21 years (21). Consequent unnecessary procedures conducted for treatment of pre-invasive lesions that would regress or were falsely identified may have adverse reproductive and pregnancy outcomes (22) are especially salient for younger adult women who anticipate future pregnancy. In addition, screening women aged younger than 21 years, and all women annually can cause undue patient anxiety (23, 24) and costs to both patients and the healthcare infrastructure (25–27).

By adhering to evidence-based guidelines, clinicians can minimize the physical, emotional, and financial costs of overscreening and overtreatment (20, 22, 28–30). A national baseline of cervical cancer screening among young adult women before the 2012 screening guidelines update is necessary to measure implementation of current evidence-based

guidelines for screening onset and frequency. To meet this need, national survey data from 2000–2010 were analyzed to estimate the prevalence of cervical cancer screening among women ages 18–29 years in the United States, focusing on these ages because of the distinction made in screening initiation and test recommendations on the basis of patient age.

Materials and Methods

Study population

The National Health Interview Survey (NHIS) is an annual survey of the civilian, noninstitutionalized U.S. population, conducted by the Centers for Disease Control and Prevention (CDC), National Center for Health Statistics (NCHS). Using multistage cluster sample design, a representative sample of households is selected for participation, and a personal household interview is conducted by U.S. Census Bureau interviewers according to procedures specified by NCHS. CDC's Division of Cancer Prevention and Control and National Cancer Institute's Division of Cancer Control and Population Sciences sponsor the Cancer Control Supplement of NHIS. Analyses that use public-use data do not require CDC Institutional Review Board approval.

NHIS collects self-reported information about Papanicolaou (Pap) test use from a randomly selected adult participant through the adult core and supplemental cancer control modules. Two distinct study samples based on survey data years were used for analysis. For the trend analysis (years 2000, 2005, 2008, and 2010), the study sample was restricted to women ages 18–29 years who reported never having a hysterectomy and ever having a Pap test (n =11,248). This analysis was to estimate Pap test use over time. The second analysis focused only on 2010 data and was restricted to women ages 18–29 years who reported never having a hysterectomy and ever having a Pap test (n = 2,198). This analysis was to estimate age of first Pap test, time since most recent Pap test, and predictors of having a Pap test in the previous 12 months. To examine time since most recent Pap test and predictors of having a Pap test in the previous 12 months, the study sample was further restricted to women who both reported their most recent Pap test was a part of a regular screening exam, and no abnormal Pap test in previous 3 years (n = 1,622).

Data measures

Two distinct outcome measures were created for the analysis of cervical cancer screening practices of women ages 18–29 years. First, to provide an historical assessment of Pap test participation, responses to the question, "Have you ever had a Pap test?" were analyzed. Respondents were read a definition of the Pap test before responding: "A Pap smear or Pap test is a routine test for women in which the doctor examines the cervix, takes a cell sample from the cervix with a small stick or brush, and sends it to the lab." Rates of women who reported they ever received a Pap test in 2000, 2005, 2008, and 2010 are presented, the years that NHIS included this question in the supplemental cancer control module.

Second, to provide a baseline for measuring future changes in screening initiation and frequency among women ages 18–29 years, 2010 data concerning reported age at first Pap

test, time since most recent Pap test, and predictors of having a Pap test within the previous 12 months were examined. Respondents who reported ever having a Pap test were asked “At what age did you have your first Pap test?” and “When did you have your most recent Pap test?” Age of first Pap test was a new question on the 2010 NHIS, providing novel data findings and an opportunity for comparison with future screening initiation data.

Correlates

Self-reported sociodemographic variables, namely age, race/ethnicity, educational attainment, poverty level (imputed income data), marital status, healthcare coverage (public, private, or none), and access to usual source of healthcare (a place other than emergency room where routine care is sought), were analyzed in relation to cervical cancer screening outcome measures. To adjust for their potential impact on age of initiation and frequency of Pap testing, awareness of HPV, HPV vaccine status, having ever given birth to a live born infant (increased visits with a provider, and Pap testing may occur during antepartum care), current birth control use (pills, implants, shots), and whether a physician recommended the most recent Pap test were included in the model.

Statistical analysis

NHIS has a complex survey design involving stratification, clustering, and disproportionate sampling. To provide national estimates of cervical cancer screening outcome measures, SAS version 9.2 and SUDAAN release 10.0.1 (Research Triangle Institute, Research Triangle Park, NC) were used to apply sampling weights and account for stratified survey design.

Linear trends for years 2000–2010 for all women ages 18–29 years were tested using unadjusted logistic regression models. Differences between years 2000 and 2005, 2000 and 2008, and 2000 and 2010 were tested separately for each age group (18, 19, 20, 21, 22–29 years) using linear test for contrast.

For the 2010 analysis of women who have ever had a Pap test, examining age at first Pap test by sociodemographic variables, the mean, median, and range, and 95% confidence intervals (CI) were reported. The difference between mean age for all covariates was tested using the *t* test for mean and corresponding *P* values were noted. For the univariable analysis of time since most recent Pap test, weighted proportions with 95% CIs were reported. Association between last reported screening and sociodemographic variables was assessed using χ^2 statistics.

To better understand the determinants of a more frequent interval for average-risk women ages 18–29 years, potential predictors of having a Pap test in the previous 12 months using multivariable logistic regression model were examined. To construct the multivariable model, a univariable analysis comparing last Pap test reported within 12 versus 13–36 months (data not shown) was conducted. Only statistically significant variables with $P < 0.05$ were included in the multivariable models. Associations were assessed with Wald-F statistics and differences among the age groups were tested using linear contrast and

footnoted as significant. In addition, estimates based on 30 or fewer sample cases are considered to be unreliable and were suppressed and footnoted in the tables when necessary.

Results

Pap test trends among women ages 18–29 years, 2000–2010

Pap test trends for all ages combined reporting ever having a Pap test from 2000–2010 were not significant ($P = 0.243$). However, the percentage of 18-year-old women who ever had a Pap test significantly decreased from 49.9% in 2000 to 37.9% in 2010 ($P = 0.045$), and among 22–29-year-old women, the percentage significantly decreased from 91.3% in 2000 to 89.3% in 2008 ($P = 0.034$; Fig. 1).

Participant demographics, 2010

The 2010 study sample comprised mostly of non-Hispanic white (63.4%) women between the ages of 22–29 years (76.6%), who reported completing at least some college (39.7%), were living <200% above the federal poverty level (55.2%), never been married (48.2%), or were married/living with a partner (48.0%). Many were enrolled in a private health insurance plan (32.0%), reported a usual source of healthcare (79.0%), reported awareness of HPV (82.6%), or reported never receiving the HPV vaccine (81.4%). Most had never given birth to a live born infant (55.7%), and less than half were currently using non-barrier birth control (41.3%). Most reported having received a physician recommendation for their most recent Pap test (54.0%; Table 1).

Age at first Pap test, 2010

Reported mean age at first Pap test was significantly younger for 18-year-olds (15.9 years; $P < 0.001$) compared with women ages 19–29 years. Mean age at first Pap test was significantly younger for non-Hispanic blacks (16.9 years; $P < 0.001$), and older for Hispanics (18.1 years; $P < 0.001$) and Asians (19.8 years; $P < 0.001$) compared with non-Hispanic whites (17.4 years). Mean age at first Pap test was significantly younger for those with <high school education (16.9 years) compared with those with a college degree or greater (18.5 years; $P < 0.001$), for those reporting HPV vaccination (17.1 years; P 0.002), and having ever given birth (17.3 years; $P < 0.001$; Table 2). Among women ages 18–29 years who reported receiving the HPV vaccine, 20.6% ($n = 80$) also reported a history of an abnormal Pap test in the previous 3 years (data not shown).

Time since most recent Pap test and predictors of last Pap test within 12 months, 2010

Most women ages 18–29 years reported their last Pap test was within the previous 12 months (73.1%; 95% CI, 70.4%–75.6%); few reported last Pap test within the previous 2 to 3 years (7.6%; 95% CI, 6.3%–9.2%). Usual source of healthcare ($P < 0.001$) and current birth control use ($P < 0.001$) were significantly associated with screening frequency (Table 3). Multivariable regression modeling to examine the odds of reporting a Pap test during the previous 12 months, compared with greater than 12 months found that current use of birth control ($P < 0.001$; OR, 2.31; 95% CI, 1.74%–3.06%) and usual source of healthcare ($P = 0.002$; OR, 1.64; 95% CI, 1.20%–2.25%) were significant (Table 4).

Discussion

Because of how rare cervical cancer is among young women, and the harms associated with overscreening and treatment, national organizations are consistently recommending initiating cervical cancer screening at age 21 years, with longer intervals between screenings (17–19). These data showed a significant continuing decline in Pap testing among 18-year-old women during 2000–2010. This may reflect early adoption of later screening initiation recommendations among women younger than 21 years of age (31), possibly due to provider acceptance of, or the growing awareness among the public of the harms associated with premature screening and intervention. However, most young adult women reported screening within the previous 12 months, signaling the possibility of too-frequent Pap testing. Having a usual source of healthcare and current use of birth control methods requiring provider administration or provision (pills, implants, or shots) were strongly associated with the likelihood of having a Pap test in the previous year.

Although fewer 18-year-olds reported ever receiving a Pap test in 2010, those who did had a younger age of initiation, compared with those ages 19–29 years who were surveyed. Upon further examination of the 18-year-olds who did report ever having a Pap test, 15.6% had a history of abnormal screening results (data not shown). Previous studies have shown greater Pap test use among women reporting risky sexual behaviors (32), possibly explaining earlier Pap test initiation among these young women. Following younger users of the Pap test is important to understanding whether guidelines that discourage screening on the basis of sexual history are being implemented.

Non-Hispanic black women and women with less than a high school education reported a significantly younger age of Pap test initiation. Because 2010 was the first time data on age of first Pap test were collected on the NHIS, there is no previous screening initiation data available with which to compare these findings. Lower Pap testing rates have been documented among women with less education, Hispanic ethnicity, and shorter length of U.S. residency (33–36). Women who were vaccinated with the HPV vaccine also reported a younger age of first Pap test. Vaccine and Pap test receipt may be correlated, potentially indicating vaccination and screening in the same visit. In addition, age of first Pap test was younger for women who reported ever giving birth, as antepartum care increases visits with a provider and the potential for Pap testing.

The finding that most women reported their last Pap test within 12 months is not surprising. While at least one-third of the sample should report their last Pap test within the previous 12 months, even if all women were screened every 3 years, annual cervical cancer screening is commonly reported by young adult women (37–40) and providers (41, 42). Usual source of healthcare and current birth control use as significant variables impacting cervical cancer screening frequency has also been supported by previous research (36, 43, 44). Pap tests and pelvic exams often are used as a prerequisite for birth control prescriptions, despite guidelines indicating they are unnecessary (45, 46). The relationship between birth control use and Pap test receipt among young adults is significant, considering 36.6% of all women ages 18–29 years in the 2010 NHIS (data not shown) and 41.3% of this study sample report current birth control use. If the relationship between birth control use and Pap test receipt

among younger adults is linked (38), it would be important to discourage providers from offering Pap testing during visits for prescribing and administering contraception and to inform providers that an annual Pap test is not a necessary prerequisite to prescribe birth control through system-level intervention and incentive.

We acknowledge several limitations with this study. While self-report is a common method used to assess Pap test utilization in national surveys, social desirability bias, recall bias, and overreporting of Pap test use possibly due to women equating any examination of the pelvic area with Pap test (43, 47–49) could potentially impact results. The number of women ages 18 and 19 years included in the 2010 study sample was small and should be noted. Because of the small percentage of women who reported HPV vaccination (18.6%), consistent with the lower uptake of the vaccine throughout the United States (50), the variable could not be further examined in this analysis. However, we believe it is crucial to provide baseline estimates of HPV vaccination for this age group, anticipating future analyses will have larger sample sizes to evaluate relationships. In addition, we were not able to control for screening in this age group that could occur in the context of prenatal and post-partum care (38).

NHIS is the principal source of information on the health of the civilian noninstitutionalized population of the United States and provides self-reported screening rates to evaluate trends and determine whether collectively we are progressing toward meeting *Healthy People 2020* objectives. This analysis presents an opportunity to nationally track screening behaviors among young adult women. It is significant because it is the first study using NHIS data to assess cervical cancer screening among women ages 18–29 year, and includes results from a novel NHIS question regarding age at initiation of cervical cancer screening. Studying this age cohort is important because of the distinct changes to screening guidelines that have occurred and the growing evidence base for less frequent intervention among young adult women.

Conclusions

Given the growing body of scientific evidence, women and clinicians should feel comfortable adopting later and less frequent intervention for cervical cancer detection among young adult women. As evidence-based screening guidelines gradually become more accepted among patients and providers, we anticipate continued decreases in the percentage of 18-year-old women reporting ever being screened and 18- to 29-year-old women reporting their last Pap test 12 months before survey. These anticipated changes signal research opportunities, including examining the characteristics and predictors of women who report their most recent Pap test 2 to 3 years before survey, and whether their reported interval was due to their provider implementing screening according to guidelines, or irregular healthcare access. In addition, understanding how the HPV vaccine and Pap test are used together in clinical practice will be of increasing public health significance as girls who were vaccinated become old enough for Pap testing. It will also be important to understand the content and delivery of cervical cancer screening guidance providers are offering to their patients after HPV vaccination. Continued unnecessary clinical services can lead to evaluation and treatment that generate physical, emotional, and financial costs.

Implementation of evidence-based cervical cancer screening would increase the quality of cervical cancer prevention services for all women and reduce costs throughout society.

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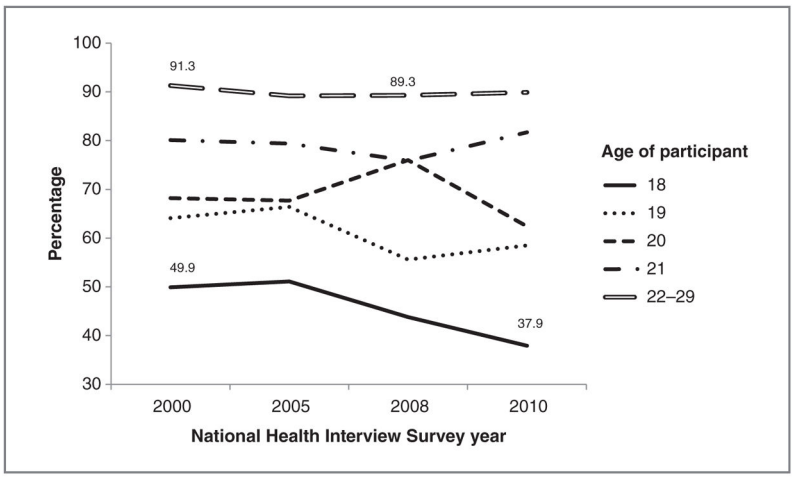

Figure 1.

Trends in the percentage of women ages 18–29 years who report ever having a Pap test, NHIS, 2000–2010. NOTE: Excludes women reporting hysterectomy. Hysterectomy status of respondents was not asked in NHIS 2003 so data from the 2003 survey were not included in the trend analysis of Pap test receipt for years 2000–2010. Significant linear trends include percentages to measure change.

Table 1

Demographic characteristics among women ages 18–29 years who have ever had a Pap test, NHIS, 2010 (*N* = 2,198)

	Participant demographics	
	n	**% (95% CI)**
Age of respondent, y		
18	64	3.8 (2.8–4.9)
19	105	6.2 (4.9–7.7)
20	120	6.3 (5.1–7.9)
21	156	7.2 (5.8–8.8)
22–25	823	38.2 (35.8–40.6)
26–29	930	38.4 (36.1–40.7)
Race/ethnicity		
Non-Hispanic White	1088	63.4 (60.8–66.1)
Non-Hispanic Black	462	15.9 (14.1–17.9)
Asian	105	3.3 (2.6–4.2)
Hispanic or Latino	529	16.5 (14.7–18.4)
Other[a]	*b*	*b*
Education		
<High school	306	12.0 (10.5–13.6)
High school graduate/GED	513	23.1 (20.8–25.4)
Some college	863	39.7 (37.3–42.1)
College graduate or greater	513	25.3 (23.2–27.5)
% Poverty level		
<200%	1399	55.2 (52.4–58.0)
200%–<400%	417	20.7 (18.4–23.2)
≥400%	382	24.1 (21.6–26.8)
Marital status		
Never married	1140	48.2 (45.7–50.6)
Married/living with a partner	920	48.0 (45.4–50.5)
Widowed/divorced/separated	134	3.8 (3.1–4.8)
Healthcare coverage		
Private only	657	32.0 (29.6–34.5)
Public only[c]	527	20.5 (18.5–22.8)
Public and private	479	24.4 (22.2–26.6)
None	529	23.1 (21.1–25.4)
Usual source of healthcare		
Yes	1721	79.0 (76.8–81.2)
No	476	21.0 (18.9–23.2)
Ever heard of HPV		
Yes	1771	82.6 (80.6–84.5)
No	420	17.4 (15.5–19.4)

	Participant demographics	
	n	**% (95% CI)**
HPV vaccine status		
Vaccinated	395	18.6 (16.5–20.8)
Not vaccinated	1775	81.4 (79.2–83.5)
Currently taking birth control[d]		
Yes	849	41.3 (38.7–44.0)
No	1336	58.7 (56.0–61.3)
Ever given birth to a live born infant?		
Yes	1096	44.3 (41.7–46.9)
No	1101	55.7 (53.1–58.3)
Doctor recommended most recent Pap test[e]		
Yes	1185	54.0 (51.2–56.7)
No	951	43.8 (41.0–46.6)

NOTE: Excludes women reporting hysterectomy and includes all women who report ever having a Pap test (including those with abnormal Pap test history).

[a] "Other" = non-Hispanic all other race groups.

[b] Estimates are considered statistically unreliable and are suppressed if the cell size is based on fewer than 30 sample cases.

[c] Medicare, Medicaid (Military defined as private)

[d] Pills, implants, shots.

[e] Response "Did not see a doctor on the past 12 months" included in analysis, but not included in this table

Table 2

Age of first Pap test among women ages 18–29 years, NHIS, 2010 (N = 2,198)

	Age of first Pap test				
	n	**Mean age (95% CI)[a]**	***P***	**Median age**	**Age range**
Age of respondent, y					
18	62	15.9 (15.5–16.3)[b]	<0.001	16.0	12–18
19	103	17.1 (16.8–17.4)	—	17.0	14–19
20	117	17.0 (16.7–17.3)	—	17.0	13–20
21	153	17.5 (17.1–17.8)	—	18.0	11–21
22–25	788	17.5 (17.3–17.7)	—	17.0	11–25
26–29	866	17.9 (17.7–18.2)	—	18.0	6–29
Race/ethnicity					
Non-Hispanic White	1048	17.4 (17.3–17.6)	—	17.0	8–29
Non-Hispanic Black	431	16.9 (16.7–17.1)[d]	<0.001	17.0	6–27
Asian	101	19.8 (19.0–20.5)[c]	<0.001	19.0	13–28
Hispanic or Latino	495	18.1 (17.8–18.4)[d]	<0.001	18.0	8–26
Other[d]	*e*	*e*	—	*e*	*e*
Education					
<High school	288	16.9 (16.5–17.2)[f]	<0.001	17.0	9–26
High school graduate/GED	476	17.4 (17.1–17.7)	—	17.0	8–26
Some college	830	17.2 (17.0–17.4)	—	17.0	6–27
College graduate or greater	492	18.5 (18.2–18.8)	—	18.0	11–29
% Poverty level[g]					
<200%	1337	17.3 (17.1–17.5)	—	—	—
200%–<400%	393	17.8 (17.5–18.2)	—	—	—
≥400%	359	17.9 (17.6–18.2)	—	—	—
Marital status					
Never married	1086	17.5 (17.4–17.7)	—	18.0	6–27
Married/living with a partner	878	17.6 (17.4–17.8)	—	17.0	8–29
Widowed/divorced/separated	122	17.1 (16.6–17.7)	—	17.0	12–26

	Age of first Pap test				
	n	**Mean age (95% CI)[a]**	***P***	**Median age**	**Age range**
Healthcare coverage					
Private only	629	17.7 (17.8–18.0)	—	18.0	8–28
Public only[h]	488	17.0 (16.8–17.3)	—	17.0	6–26
Public and private	462	17.8 (17.5–18.1)	—	18.0	11–27
None	504	17.5 (17.2–17.8)	—	17.0	6–29
Usual source of healthcare					
Yes	1635	17.5 (17.3–17.7)	—	17.0	6–28
No	453	17.7 (17.4–18.0)	—	18.0	6–29
Ever heard of HPV					
Yes	1704	17.5 (17.4–17.7)	—	17.0	6–29
No	383	18.0 (17.7–18.4)	—	18.0	6–26
HPV vaccine status					
Vaccinated	388	17.1 (16.8–17.4)[i]	0.002	17.0	11–26
Not vaccinated	1680	17.6 (17.5–17.8)	—	18.0	6–29
Currently taking birth control[j]					
Yes	828	17.4 (17.2–17.6)	—	18.0	6–29
No	1253	17.6 (17.4–17.8)	—	18.0	8–28
Ever given birth to a live born infant?					
Yes	1020	17.3 (17.1–17.5)[k]	<0.001	17.0	6–28
No	1069	17.8 (17.6–17.9)	—	18.0	8–29
Doctor recommended most recent Pap test[l]					
Yes	1134	17.5 (17.3–17.6)	—	17.0	6–28
No	901	17.7 (17.4–17.9)	—	18.0	6–29

NOTE: Excludes women reporting hysterectomy, and includes all women who report ever having a Pap test (including those with abnormal Pap test history)

[a] Unlike median and age range estimates, analyses of mean age were conducted taking into account weighting and complex survey design.

[b] Compared with all other ages, $P < 0.001$.

[c] Compared with non-Hispanic White, $P < 0.001$.

[d] "Other" = non-Hispanic all other race groups.

[e] Estimates are considered statistically unreliable and are suppressed if the cell size is based on fewer than 30 sample cases.

[f] Compared with college graduate or greater, $P < 0.001$.

[g] Poverty is an imputed variable, therefore median age and age range is not available.

[h] Medicare, Medicaid (Military defined as private).

[i] Compared with nonvaccinated, $P = 0.002$.

[j] Pills, implants, shots.

[k] Compared with never giving birth, $P < 0.001$.

[l] Response “Did not see a doctor on the past 12 months” included in analysis, but not included in this table.

Table 3

Time since most recent Pap test among women ages 18–29 years by demographic characteristics, NHIS, 2010 (n = 1,622)

		≤12 mo		13–24 mo		25–36 mo[a]	
Time since most recent Pap	***P*** **(χ^2)**	***n***	**% (95% CI)**	***n***	**% (95% CI)**	***n***	**% (95% CI)**
Age, y	0.057						
18–29		1182	73.1 (70.4–75.6)	317	19.3 (17.0–21.9)	123	7.6 (6.3–9.2)
18–21		270	78.3 (72.5–83.1)	56	15.8 (11.6–21.2)		*b*
22–25		445	74.7 (70.1–78.8)	110	18.4 (14.6–23.0)	41	6.9 (4.8–9.7)
26–29		467	68.0 (63.5–72.1)	151	22.6 (19.0–26.5)	57	9.5 (6.9–12.8)
Race/ethnicity	0.052						
Non-Hispanic White		584	72.4 (68.6–75.9)	161	20.2 (17.0–23.8)	59	7.4 (5.7–9.6)
Non-Hispanic Black		254	78.6 (72.4–83.7)	58	16.2 (11.9–21.7)		*b*
Asian		54	66.8 (52.2–78.8)		*b*		*b*
Hispanic or Latino		285	71.7 (66.5–76.5)	75	17.7 (14.0–22.1)	39	10.6 (7.3–15.0)
Other[c]			*b*		*b*		*b*
Education	0.167						
<High school		146	69.5 (61.7–76.3)	51	19.5 (14.3–26.1)		*b*
High school graduate		273	69.0 (63.0–74.4)	76	22.3 (17.4–28.1)		*b*
Some college		474	76.9 (72.2–80.6)	105	15.9 (12.7–19.7)	47	7.2 (5.2–9.8)
College graduate		289	72.4 (65.9–78.1)	84	21.7 (16.6–27.7)		*b*
% Poverty level	0.666						
<200%		735	73.9 (70.3–77.3)	200	19.5 (16.4–23.0)	72	6.6 (5.0–8.6)
200%–<400%		234	71.9 (64.9–77.9)	62	20.1 (14.8–26.7)		*b*
≥400%		213	72.3 (65.4–78.3)	55	18.2 (13.2–24.7)		*b*
Marital status	0.426						
Never married		611	73.5 (69.2–77.3)	162	18.6 (15.4–22.4)	69	7.9 (5.9–10.5)
Married/living with partner		511	73.0 (68.7–76.8)	139	20.4 (17.0–24.1)	45	6.7 (4.8–9.2)
Widowed/divorced/separated		59	68.7 (53.8–80.5)		*b*		*b*
Healthcare coverage	0.072						
Private only		361	73.3 (68.1–77.8)	91	18.3 (14.3–23.1)	39	8.4 (5.8–12.2)
Public only[d]		299	78.5 (72.4–83.6)	56	16.5 (11.8–22.6)		*b*

Time since most recent Pap	*P* (χ^2)	≤12 mo *n*	≤12 mo % (95% CI)	13–24 mo *n*	13–24 mo % (95% CI)	25–36 mo[a] *n*	25–36 mo[a] % (95% CI)
Both private and public		291	75.3 (69.9–79.9)	74	18.4 (14.4–23.2)		*b*
None		228	66.6 (60.8–72.0)	93	22.7 (18.1–27.9)	41	10.7 (7.7–14.7)
Usual source of healthcare	<**0.001**						
Yes		978	75.8 (72.9–78.6)	237	18.0 (15.5–20.9)	75	6.2 (4.8–7.8)
No		203	61.5 (55.1–67.6)	80	24.8 (19.2–31.3)	48	13.7 (9.9–18.5)
Ever heard of HPV	0.366						
Yes		962	73.9 (70.8–76.7)	243	18.6 (16.0–21.5)	97	7.5 (6.1–9.3)
No		216	69.0 (62.6–74.8)	74	23.0 (17.8–29.2)		*b*
HPV vaccine status	0.606						
Vaccinated		220	75.6 (68.6–81.5)	52	17.9 (12.6–24.9)		*b*
Not vaccinated		950	72.5 (69.6–75.2)	260	19.6 (17.2–22.3)	106	7.9 (6.3–9.9)
Ever given birth to a live born infant	0.238						
Yes		565	70.2 (66.0–74.1)	162	21.5 (18.0–25.5)	61	8.2 (6.1–11.0)
No		616	75.1 (71.3–78.6)	155	17.7 (14.7–21.2)	62	7.2 (5.4–9.4)
Currently taking birth control[e]	<**0.001**						
Yes		534	82.5 (79.1–85.4)	100	13.4 (10.8–16.5)	32	4.1 (2.7–6.1)
No		642	65.9 (62.1–69.5)	214	23.7 (20.3–27.4)	91	10.4 (8.5–12.8)
Doctor recommended most recent Pap test[f]	**0.043**						
Yes		618	73.2 (69.2–76.9)	168	20.3 (17.0–24.1)	57	6.4 (4.7–8.7)
No		555	74.0 (70.0–77.6)	142	18.2 (15.2–21.7)	55	7.8 (5.9–10.3)

NOTE: Includes all women who report ever having a Pap test, excludes women reporting hysterectomy, women who report an abnormal Pap in last 3 years, and women who reported their last Pap was not part of a regular screening exam.

[a] Does not include responses “more than 3 years but not more than 5 years”; “over 5 years” because this study sample excludes women who reported an abnormal Pap in the last 3 years, thereby excluding women who report most recent Pap > 3 year ago. “Refused” and “don’t know” excluded from analysis.

[b] Estimates are considered statistically unreliable and are suppressed if the cell size is based on fewer than 30 sample cases.

[c] “Other” = non-Hispanic all other race groups.

[d] Medicare, Medicaid (Military defined as private).

[e] Pills, implants, shots.

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[f]"Did not see a doctor on the past 12 months" included in analysis, but suppressed in this table.

Table 4

Multivariate analysis of characteristics associated with Pap test screening in the last 12 months among women ages 18–29 years, NHIS, 2010 (n = 1,622)

	Most recentPap test ≤ 12 mo[a]	
	OR (95% CI)	***P* (Wald-F)**
Age, y		0.086
18–21	1.54 (1.03–2.31[b])	
22–25	1.24 (0.92–1.69)	
26–29	1.00	
Healthcare coverage		0.219
Private only	1.00	
Public only[c]	1.57 (0.93–2.66)	
Both private and public	1.13 (0.79–1.61)	
None	0.99 (0.66–1.48)	
Usual source of healthcare		0.002
Yes	1.64 (1.20–2.25)	
No	1.00	
Ever heard of HPV		0.620
Yes	1.09 (0.77–1.54)	
No	1.00	
Ever given birth to a live born infant		0.534
Yes	0.90 (0.64–1.26)	
No	1.00	
Currently taking birth control[d]		<0.001
Yes	2.31 (1.74–3.06)	
No	1.00	
Doctor recommended most recent Pap test[e]		0.094
Yes	0.96 (0.72–1.29)	
No	1.00	

NOTE: Excludes women reporting hysterectomy, women who report an abnormal Pap in last 3 years, and women who reported their last Pap was not part of a regular screening examination. To construct our multivariable model, we conducted a separate bivariate analysis comparing last Pap test reported within 12 versus 13–36 months (data not shown). Statistically significant variables with $P < 0.05$ from this separate bivariate analysis were included in the multivariate analysis. as covariates.

[a] Among women who have ever had a Pap, odds of reporting most recent Pap within 12 months, compared to all other intervals (>1–2, >2–3, >3–5, >5years).

[b] Because the confidence interval does not overlap the referent group, we ran a contrast test for 18–21 versus 26–29 and the Wald-F $P = 0.036$.

[c] Medicare, Medicaid (Military defined as private).

[d] Pills, implants, shots.

[e] Response “Did not see a doctor on the past 12 months” included in analysis, but suppressed in this table.